

FIG. 1

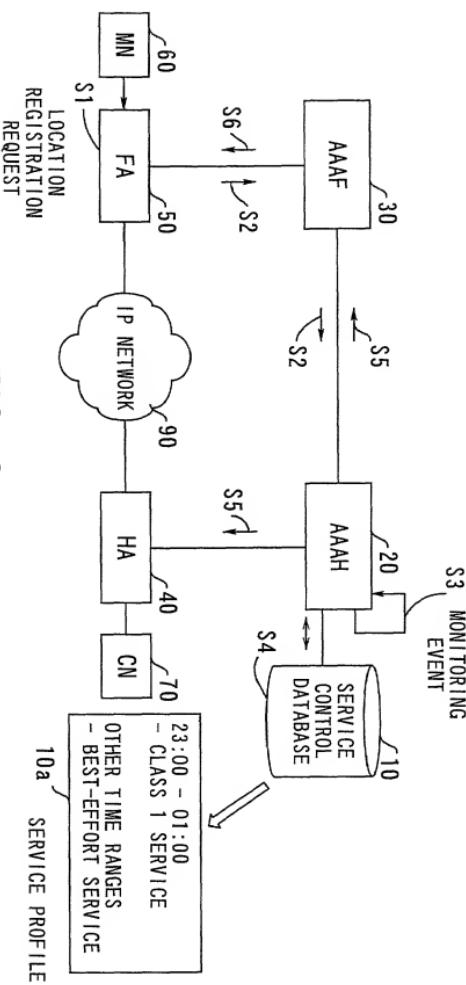


FIG. 2

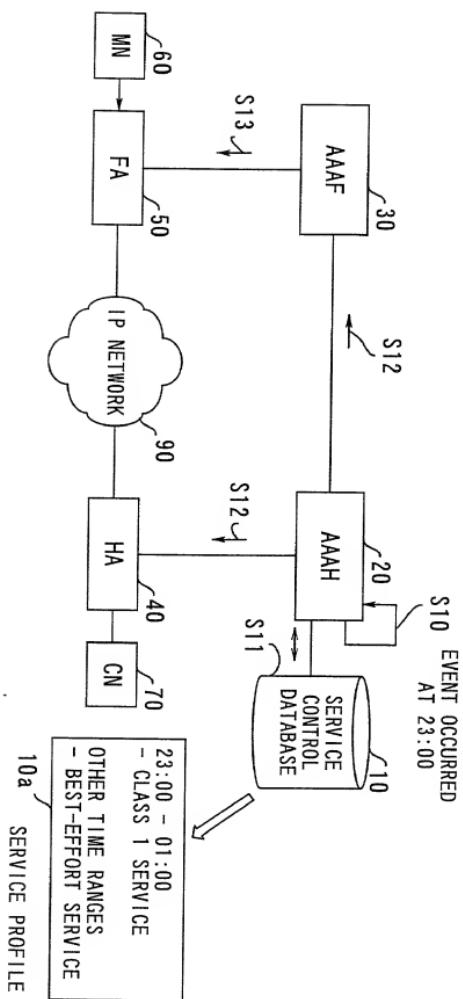


FIG. 3

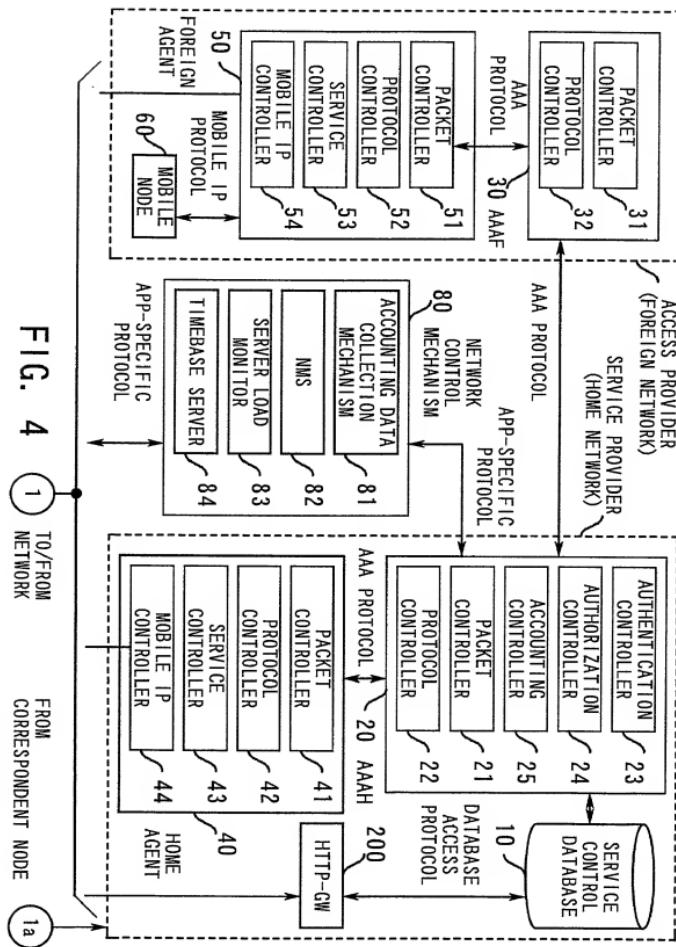


FIG. 4

TO/FROM
NETWORK

FROM CORRESPONDENT NODE

1a

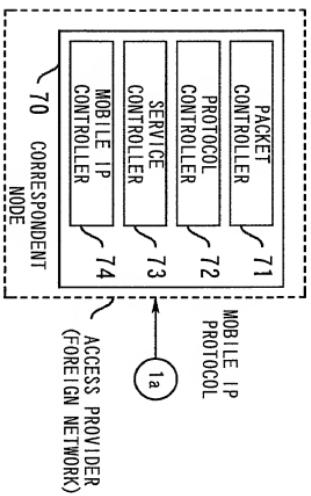
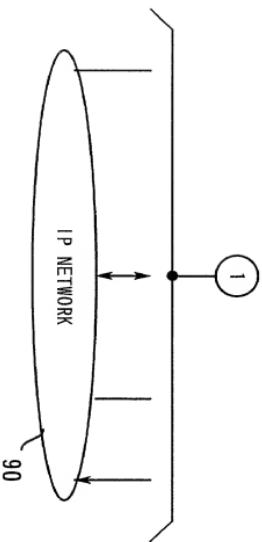


FIG. 5

Data Items	Detailed Data Items	Description
Profile Identifier	Session Identifier Profile Number	Indicate session type Uniquely assigned to each session
Source Address		
10-2 Packet Extraction Parameters	Source Port No. Destination Address Destination Port No.	Packet filtering rules
10-3 Routine/ Editing Parameters	Encapsulation (Encryption) Method Routing Address (Multiple Entries Allowed) Type of Service (TOS) Decapsulation Command	How to encapsulate packets to be routed IP address of the next node TOS field value to be set to IP header Request for decapsulation Designate which control table to search – service profile cache – binding cache – MIP home (mobility binding) – MIP foreign (visitor list) – ANYCAST (extended visitor list) – routing table
10-4 Individual Control Data	Service Control Type Control Data Identifier	Pointer to an intended part of the table

FIG. 6

Service Profile Cache	Description
Source SPC (NSPQsrc)	A collection of service profiles to be used mainly for user-independent, common services. Indexed by source address information of data packets. Created by a mobility agent at the time of initial set-up, based on static information stored in hard drives and other storage devices of network equipment.
Source Default SP (NDSPsrc)	Service profile applied when there is a hit in NSPQsrc, but no hit in individual control tables.
Node-specific SPC (NSPC)	A collection of service profiles to be used mainly for user-independent, common services. Indexed by destination address information of data packets. Created by a mobility agent at the time of initial set-up, based on static information stored in hard drives and other storage devices of network equipment.
Destination SPC (NSPQdst)	Service profile applied when there is a hit in NSPQdst, but no hit in individual control tables.
Destination Default SP (NDSPdst)	Default service profile used when no hit is found. For retrieval of a network device-specific control table (routing table).
Default SP (NDSP)	Default service profile used when no hit is found. For retrieval of a network device-specific control table (routing table).
Source SPC (ASPCsrc)	A collection of user-specific service profiles. Indexed by source address information of data packets that are sent from AAA systems when a mobile node logs in to the network.
Destination SPC (ASPCdst)	A collection of user-specific service profiles. Indexed by destination address information of data packets that are sent from AAA systems when a mobile node logs in to the network.

FIG. 7

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Search Order	Cache Class	Cache Search Result	Individual Control Data Search Result	Next Action
1	ASPCsrc	Hit	Hit	Normal end
		No Hit	No Hit	Abnormal end
2	NSPcsrc	Hit	Hit	Search NSPcsrc
		No Hit	No Hit	Normal end
		No Hit	No Hit	Search NDSPsrc
3	ASPCdst	Hit	Hit	Search ASPCdst
		No Hit	No Hit	Normal end
		No Hit	No Hit	Abnormal end
4	NSPCdst	Hit	Hit	Search NSPCdst
		No Hit	No Hit	Normal end
		No Hit	No Hit	Search NDSPdst
5	NDSP	Hit	Hit	Use NDSP
		No Hit	No Hit	Normal end
		No Hit	No Hit	Abnormal end

FIG. 8

Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
Session Timer	Remaining lifetime of this transaction

FIG. 9

Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
AAAH Address	IP address of AAAH identified by mobile node NAI
Home Agent Address	IP address of home agent allocated by AAAF
Previous Foreign Agent NAI	NAI of previous foreign agent to which the mobile node was attached
Current Foreign Agent NAI	NAI of foreign agent to which the mobile node is currently attached
SCR Requester Address	IP address of AAAH that is requesting SCR
Security Information	Authentication data for validate association between this AAAF and other entities (FA, AAAH, HA allocated by AAAH)
Session Timer	Remaining lifetime of this transaction
Foreign Agent Service Profile	See FIG. 3
Home Agent Service Profile	See FIG. 3
Current State	Waiting, HA requested, AMA in process, HA Change Requested, FA Change Requested

FIG. 10

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Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
Home Agent Address	IP address of home agent allocated by AAAH
HA-managing AAAF Address	IP address of AAAF that is allowed by AAAH to allocate home agent
Current AAAF Address	IP address of AAAF requesting AMR
Previous AAAF Address	IP address of previously used AAAF
Address Proxy Address	IP address of address proxy in ANYCAST service
Security Information	Authentication data for validate association between this AAAH and other entities (HA, AAAF)
Session Timer	Remaining lifetime of this transaction
Address Proxy Server Address	IP address of address proxy server
Foreign Agent Service Profile	See FIG. 3
Home Agent Service Profile	See FIG. 3
Current State	Waiting, HA Requested, AMA in Process, HA Change Requested, FA Change Requested

FIG. 11

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Item	Description
Session ID	<NAI of Mobile Node><32-bit Value><Optional Value>
Session Timer	Remaining lifetime of this transaction
Mobility Binding	Pointer to mobility binding
SCR Request Flag	Flag indicating that service profile is being updated in correspondent node
SCR Requester Address	IP address of the entity requesting SCR

FIG. 12

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Item	Description
IP Source Address (Home Address)	Home address assigned to mobile node. Notified by registration request or AMA message
Link Layer Source Address of Mobile Node	Link layer (MAC) address of mobile node
UDP Source Port	UDP Source port of mobile node
Home Agent Address	Address of home agent. Provided in registration request or AMA message
Registration Request Identifier	Identifier used to associate between request and response
Lifetime	Valid period of registration request
Authentication Data	Authentication data used by foreign agent to authenticate requesting mobile node

FIG. 13

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Item	Description
Home Address	Home address assigned to mobile node
Care-of Address of Mobile Node	IP address of foreign agent to which mobile node is currently attached
Correspondent Node with Route Optimization	IP address of correspondent node to which route optimization is being applied
Registration Request Identifier	Identifier used to associate between request and response
Lifetime	Valid Period of Registration Request
Authentication Data	Authentication data used by foreign agent to authenticate requesting mobile node

FIG. 14

Item	Description
User NAI	User's Network Access Identifier (NAI)
User Profile	User name, Address, Phone No. etc.
User Authentication Data	Mobile Node-AAA Authentication Key, SPI, User ID, Password
Service Level Agreement (SLA)	Service agreement with customer
Service-specific Profile	Diffserv, Packet Filtering, ANYCAST, Multi Cast, etc

FIG. 15

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Service Class	Description
Class A	Maximum transmission delay is guaranteed to be within a prescribed tolerance
Class B	In Diffserv, high priority queuing is applied as long as it does not affect Class A traffic. May be divided into several subclasses, depending on Diffserv types
Class C	Best-effort service. Lower priority queuing than Class B.

FIG. 16

532

Item	Description
Flat-rate Accounting (Fixed charge for limited hours, plus additional charge for excess hours)	(Service Class-dependent Basic Charge) + (Service Class-dependent Hourly Rate) * (Excess Hours)
Usage-based Accounting (Proportional to the amount of packets transferred)	Summation of [(Service Class-dependent Rate) * (Total Amount of Packets Transferred to/from Edge Node (Foreign Agent))]

FIG. 17

Charge
System warns the user when the amount of service charges has exceeded a limit predefined by the user, prompting him/her to decide whether to continue the service.

Time

User may choose a more affordable service which is available only in low-traffic hours.

Service Class

User may choose variable-class service which provides different levels of service depending on the time of day.

Roaming Option

User may choose variable-class service which provides different levels of service depending on the type of applications, or type of packets, to minimize the usage-based charge.

User may enable roaming option with additional cost.

FIG. 18

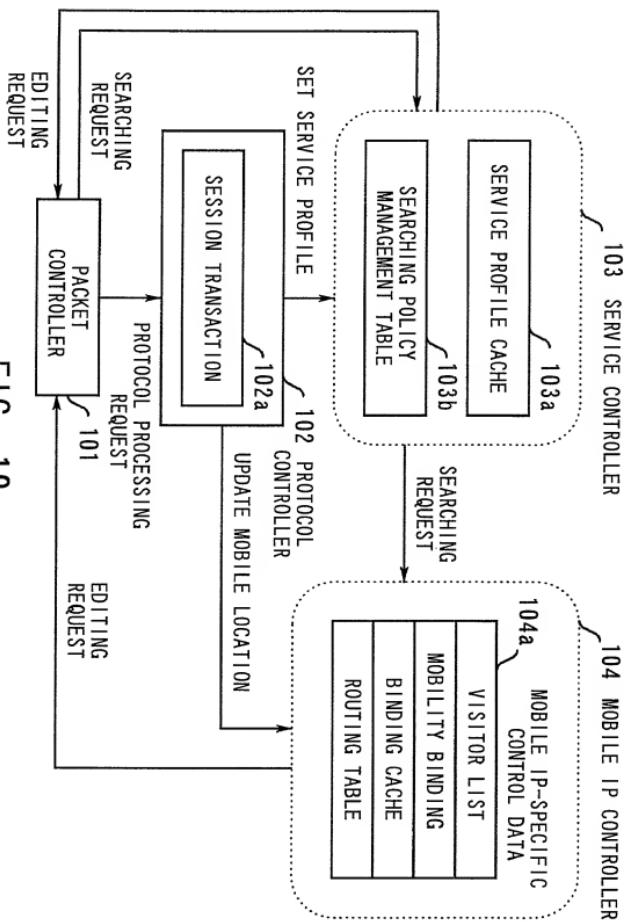


FIG. 19

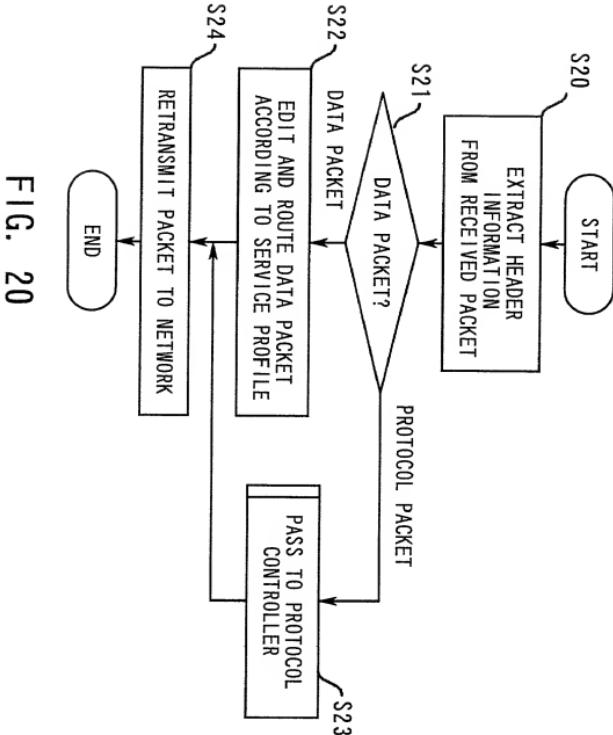


FIG. 20

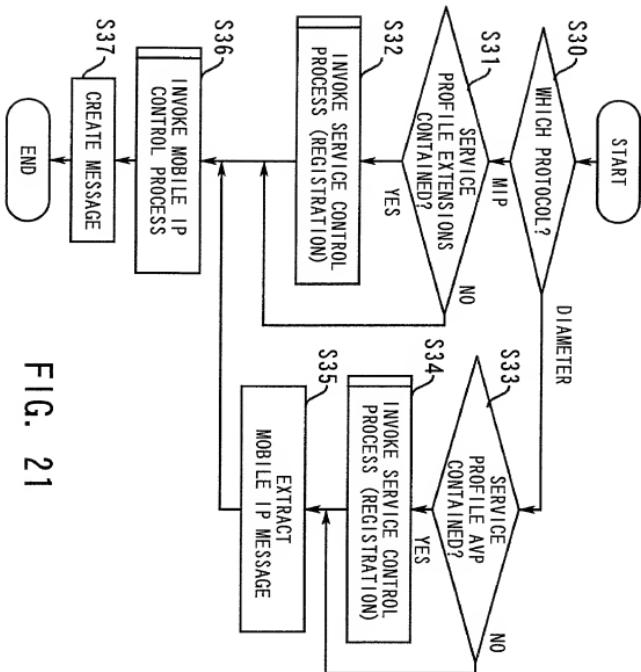


FIG. 21

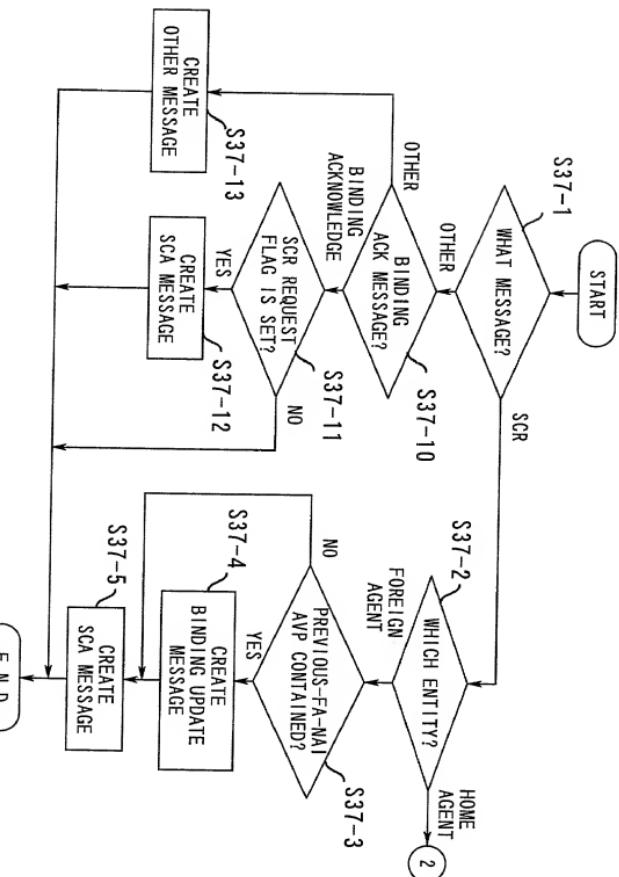


FIG. 22

FIG. 23

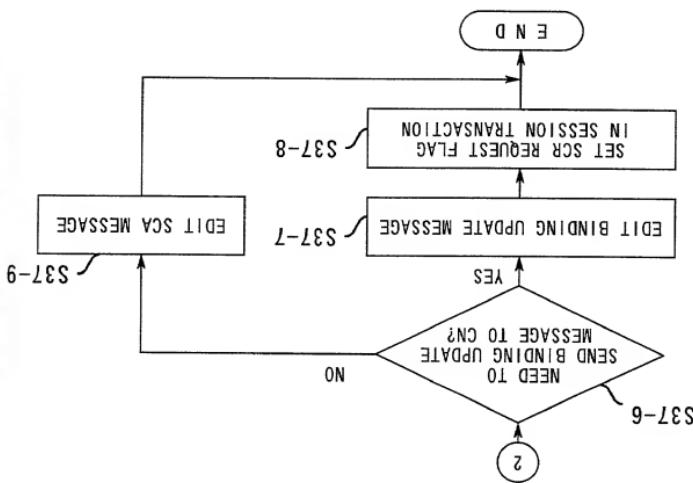


FIG. 24

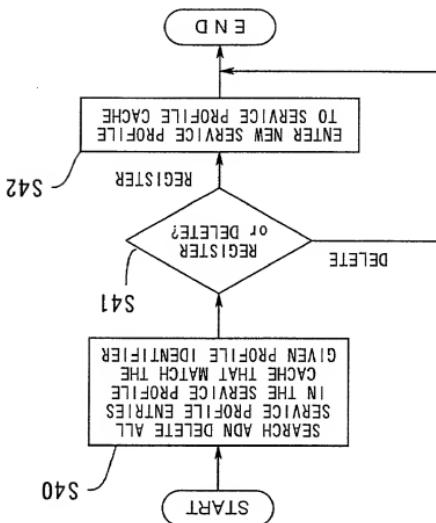


FIG. 25(A)

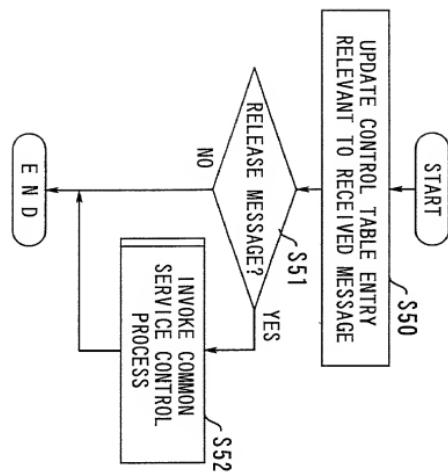
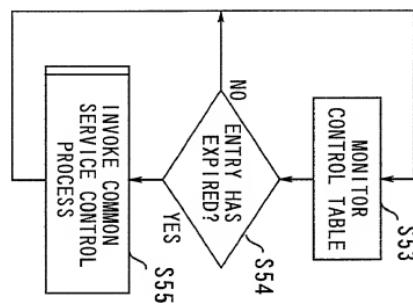


FIG. 25(B)



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Received Message

Criteria

Message to be transmitted

Protocol

Registration Request	with AAA extension	Foreign Agent	AMR	DIAMETER
Registration Request	without AAA extension	Foreign Agent	Registration Request	Mobile IP
Registration Response		Home Agent	Registration Reply	Mobile IP
AMA		Foreign Agent	Registration Reply	Mobile IP
HAR		Foreign Agent	Registration Reply	Mobile IP
Binding Update		Home Agent	HAA	DIAMETER
Binding Acknowledge	SCR is present	Foreign Agent, Correspondent Node	Binding Acknowledge	Mobile IP
SFR		Home Agent	SCA	DIAMETER
	with Previous-FA-NAL AVP	Foreign Agent, Home Agent	SFA	DIAMETER
	without Previous-FA-NAL AVP	Foreign Agent	SCA	DIAMETER
SCR	Binding Update for CN required	Home Agent	Binding Update	Mobile IP
	No Binding Update for CN required	Home Agent	SCA	DIAMETER

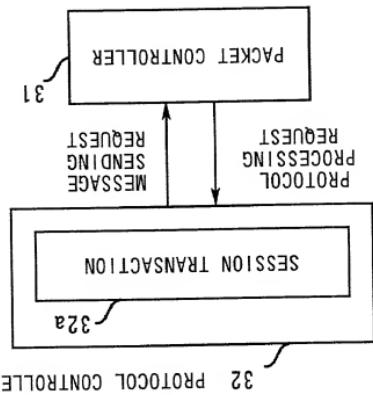
FIG. 26

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Processing Entity	Received Message	Control Table
Foreign Agent	Registration Request Message Binding Update Message	Visitor List Binding Cache
Home Agent	Registration Request Message	Mobile Binding
Correspondent Node	Binding Update Message	Binding Cache

FIG. 27

FIG. 28



32 PROTOCOL CONTROLLER

00201110-0318-0000-0000-000000000000

FIG. 29

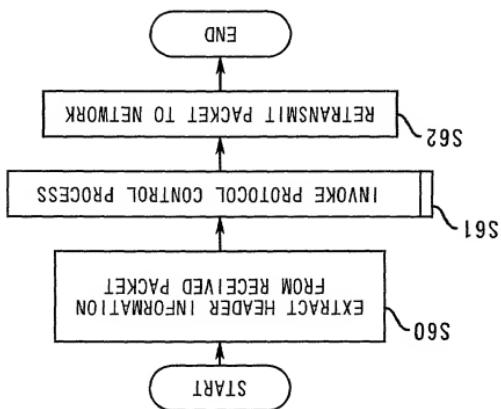
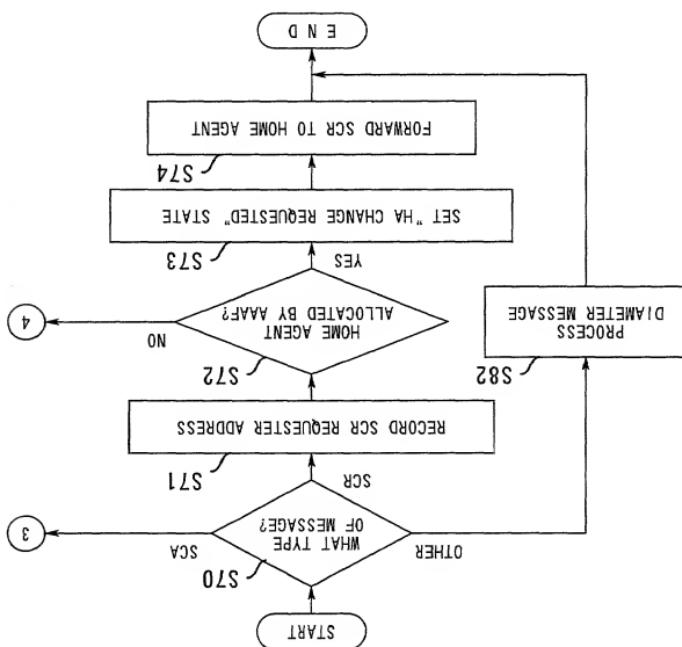
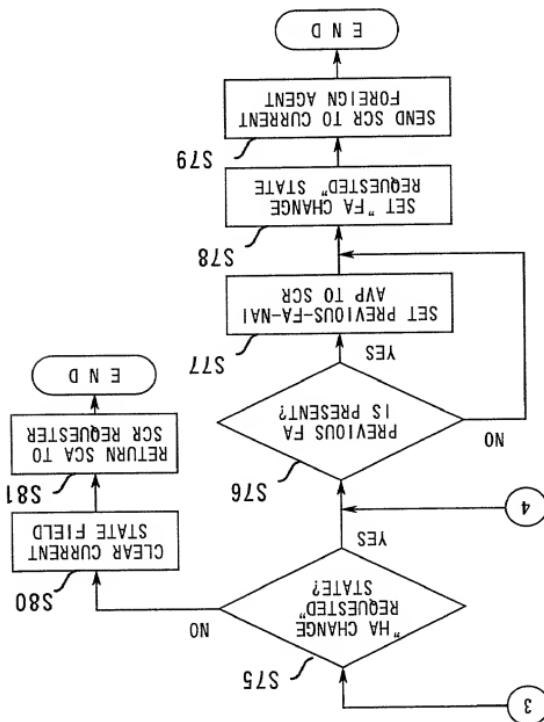


FIG. 30



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FIG. 31



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Message Received	Action to be Invoked	Criteria	Destination	Message to Send
AMR	Create session transaction	with Previous-FA-NAI AVP w/o Previous-FA-NAI AVP	AAAH Current Foreign Agent	AMR AMA
AMA	Set service profile to session transaction	w/o Home-Agent-Address AVP with Home-Agent-Address AVP	Home Agent Current Foreign Agent	HAR AMA
HAA	Set home agent address to session transaction		Current Foreign Agent	AMR
SCR	Update service profile	w/o Home Agent allocation with Home Agent allocation	Current Foreign Agent	SCR
SCA	Forward SCA message	in "HA Change Requested" state in "FA Change Requested" state	Home Agent Current Foreign Agent	SCR SCA
SFR	Forward SFR message	w/o Home Agent allocation with Home Agent allocation	Current Foreign Agent Home Agent	SFR SFR
SFA	Terminate session transaction	in "HA Release Requested" state in "FA Release Requested" state	Current Foreign Agent AAAH	SFR SFA

FIG. 32

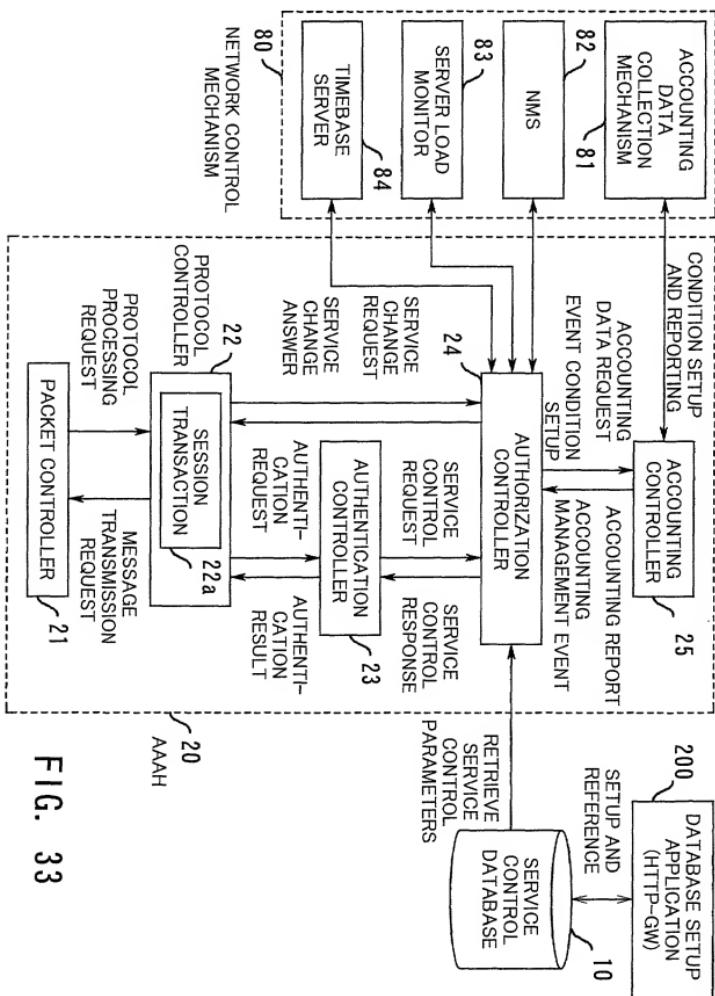
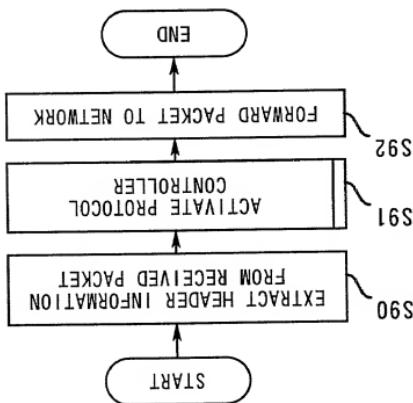


FIG. 33

FIG. 34



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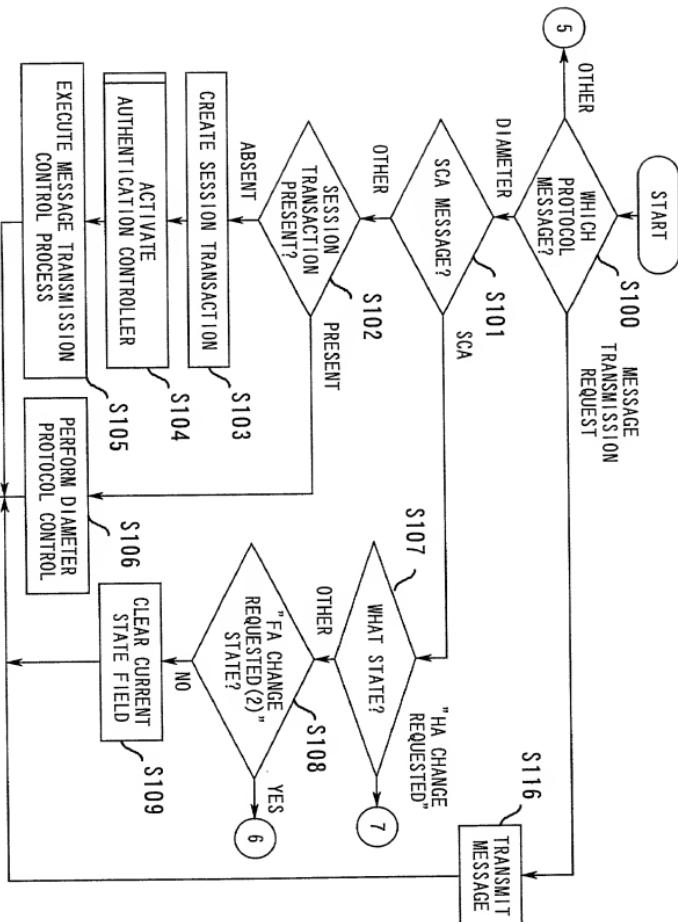


FIG. 35

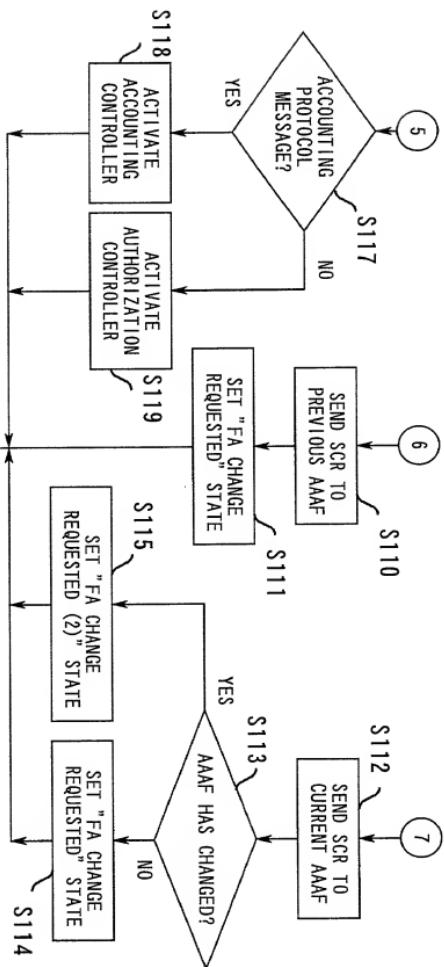


FIG. 36

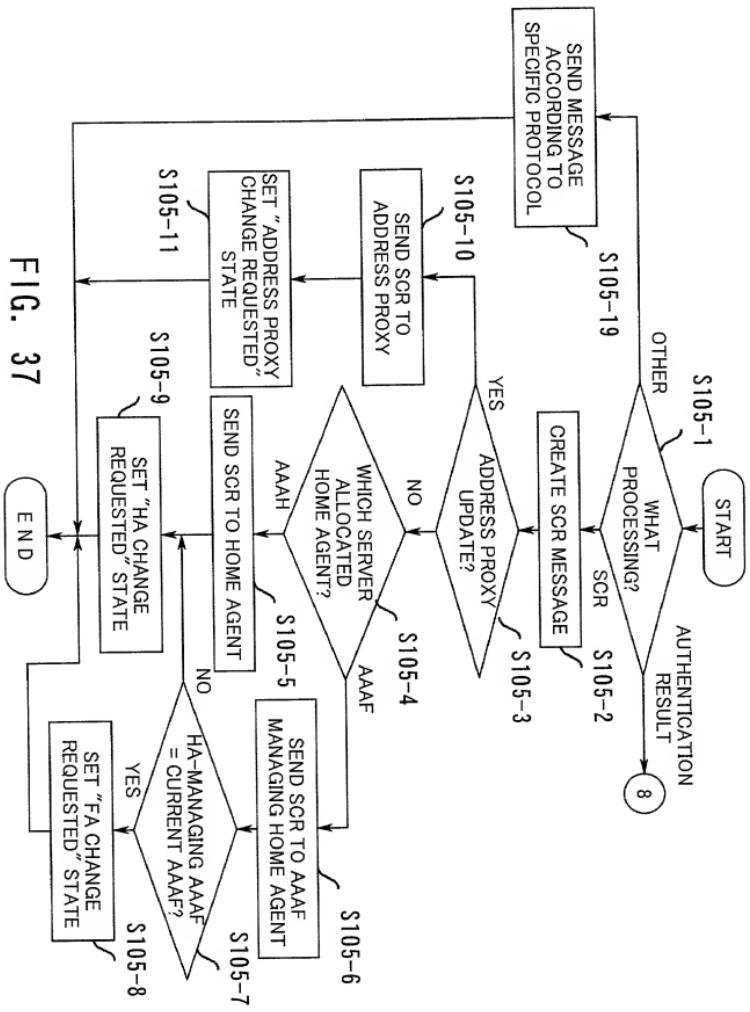


FIG. 37

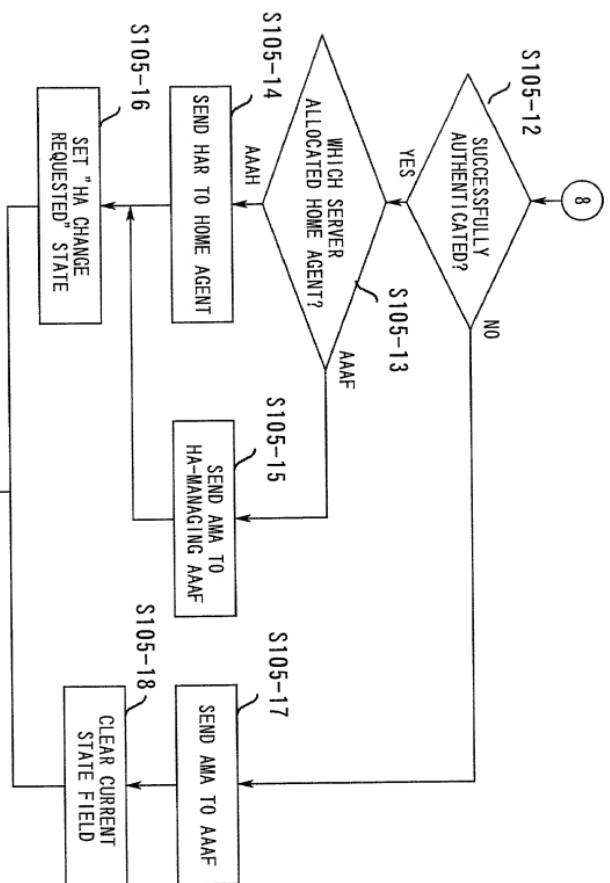
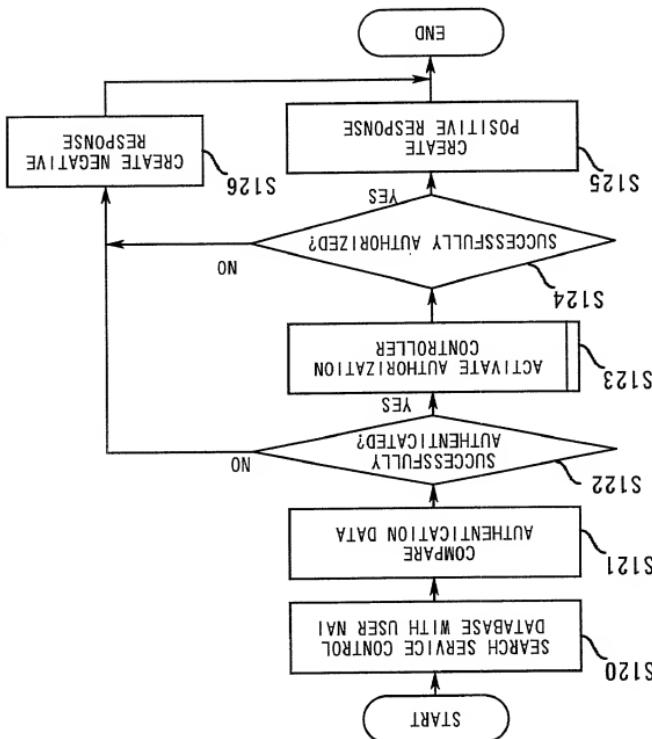


FIG. 38

FIG. 39



00-123456789-AZB-C

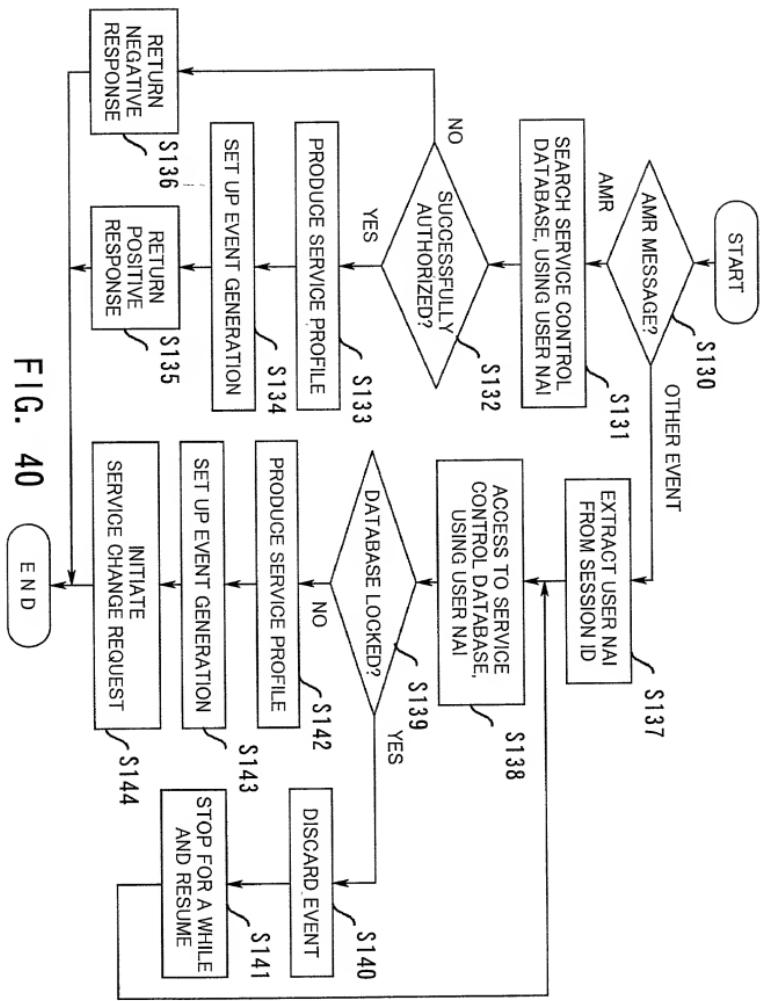


FIG. 40

FIG. 41(A)

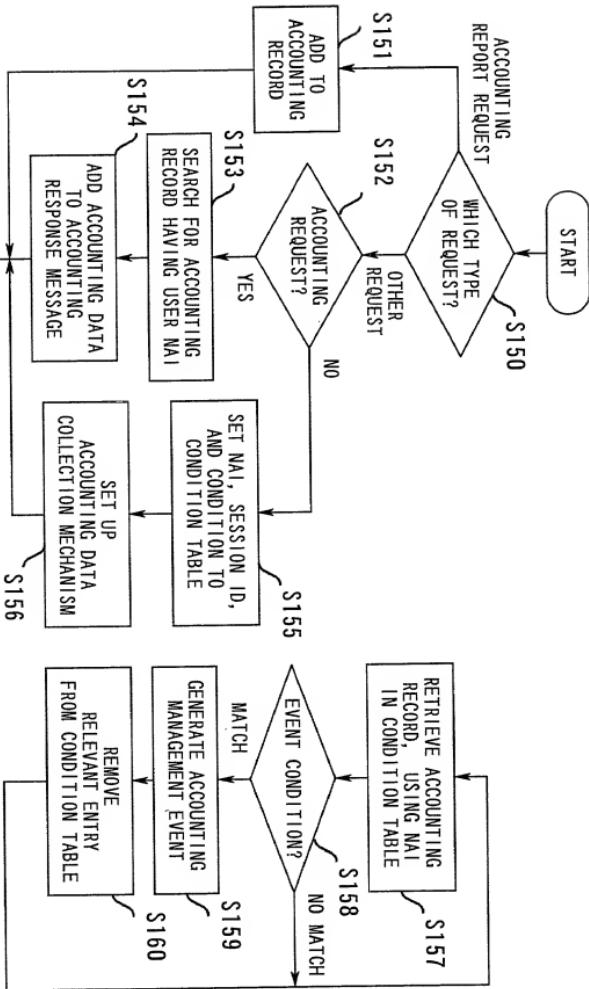


FIG. 41(B)

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Message Received	Action to be Invoked	Criteria	Destination	Message to send
AMR	Create session transaction	(Mobile node has roamed into different AAAF domain) and (Home agent has been allocated by previous AAAF)	w/ o Home-Agent-Address AVP with Home-Agent-Address AVP	Current AAAF Home Agent HAR
AMA	Forward AMA message			
HAA	Set Home Agent address to session transaction			
SCA	Forward SCA message	in "HA Change Requested" state	Current AAAF	AMA
SFR	Forward SFR message, and terminate session transaction	w/ o Home Agent allocation with Home Agent allocation	Requesting entity Home Agent SFR	SFA
SFA	Terminate session transaction	in "HA Release Requested" state	Current AAAF	SFR

FIG. 42

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NAI	Session ID	Condition
userA@domain1	<userA@domain1><10.11.22.33,<1999 02901 3445>	if \$100 ≥
userB@domain1	<userB@domain1><10.11.22.33,<1999 02900 3445>	if \$150 ≥
:	:	:
userZ@domain1	<userZ@domain1><10.12.23.4,<1999 02909 1000>	if \$50 ≥

FIG. 43

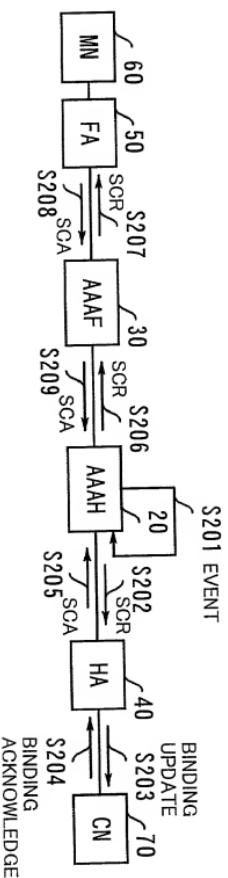


FIG. 44

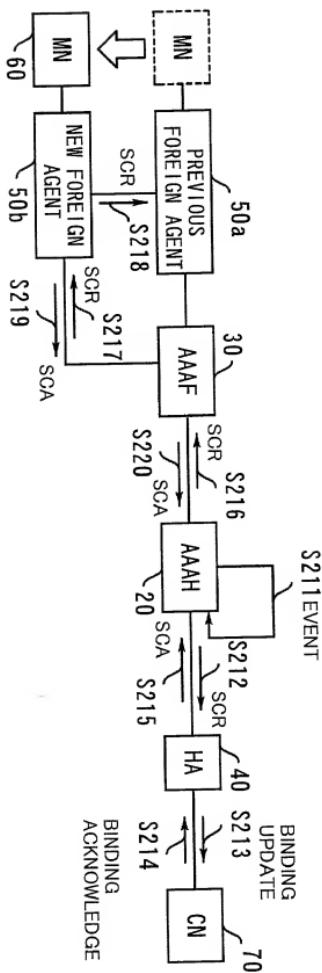


FIG. 45

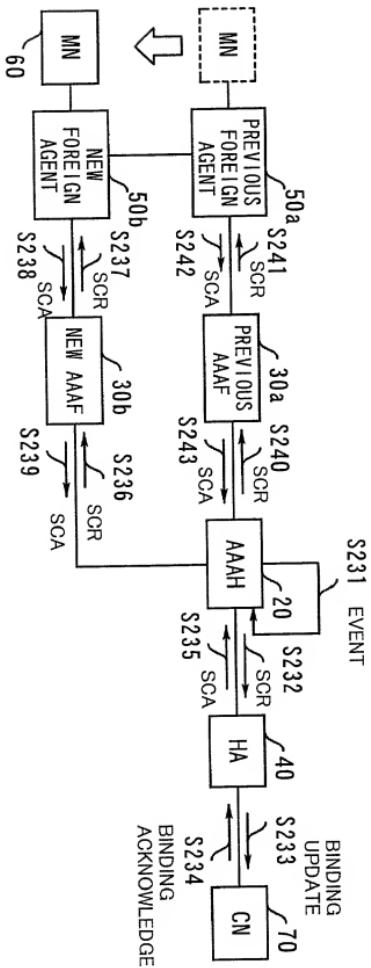


FIG. 46

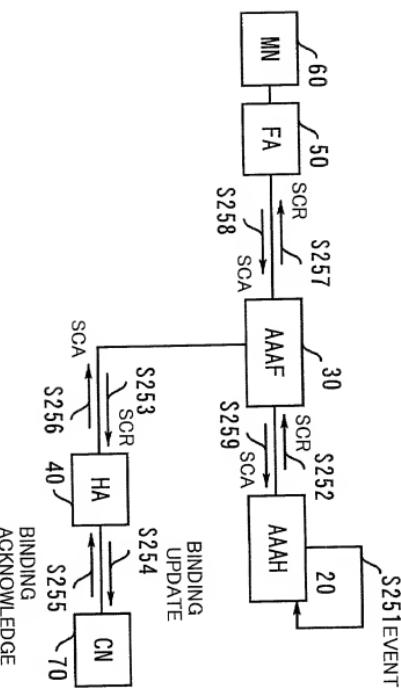


FIG. 47

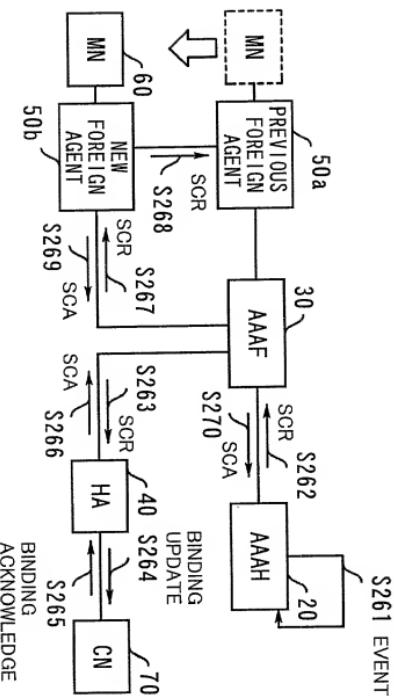


FIG. 48

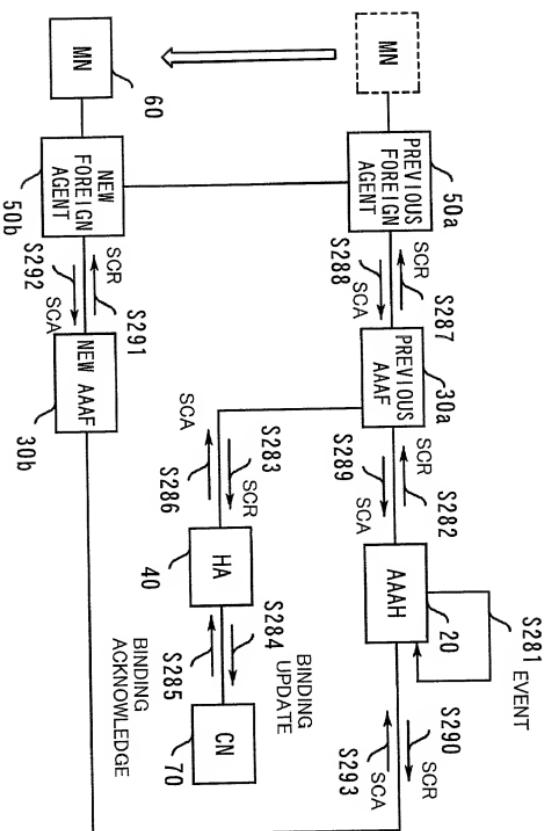
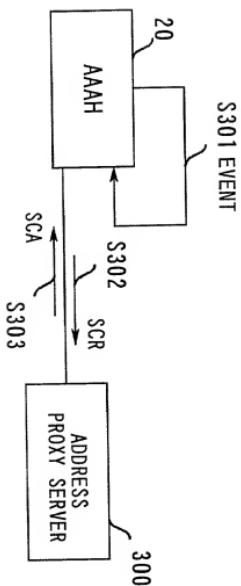


FIG. 49

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FIG. 50



	Service Type	Diffserv
Additional Information 1	Diffserv Activation Policy	*
	Service Class	Class C
	Direction	Upstream
	IP Address	*
	Port No.	*
Additional Information 2	Diffserv Activation Policy	Time : 23:00 to 08:00
	Service Class	Class B
	Direction	Downstream
	IP Address	*
	Port No.	*
Additional Information 3	Diffserv Activation Policy	Time : 08:00 to 23:00
	Service Class	Class C
	Direction	Downstream
	IP Address	*
	Port No.	*

FIG. 51

Service Type		DiffServ
Additional Parameters 1	Diffserv Activation Policy	*
	Service Class	Class C
	Direction	Upstream
	IP Address	*
Additional Parameters 2	Port No.	*
	Diffserv Activation Policy	*
	Service Class	Class B
	Direction	Downstream
Additional Parameters 3	IP Address	*
	Port No.	*
	Diffserv Activation Policy	Amount of Charges $\geq \$100$
	Service Class	Class C
Direction		Downstream
Additional Parameters 3	IP Address	*
	Port No.	*

FIG. 52

	Service Type	Packet Filtering
Additional Parameters	Filter Activation Policy (IP Address) AND (Time 08:00 to 21:00)	
	IP Address	XXX.XXX.*.*
	Port No.	*

FIG. 53